

COLLECTING FINISHED WATER SAMPLES

1 If the concentration of any pathogen in your source water samples exceeds 1 per liter during the first 12 months of sampling, then you must monitor finished water as well as source water.

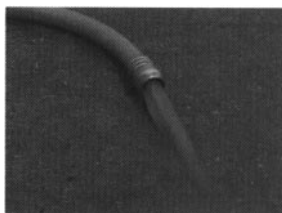
Sampling of finished water begins in the same manner as sampling of source water described previously, as follows:

When you are ready to collect your finished water virus sample, bring the following items with you to the sampling location:

- ☐ Shipping container sent by the laboratory
- ☐ Regulator Module
- ☐ Cartridge Housing Module
- ☐ Discharge Module
- ☐ Single Injector Module (for adding 2% thiosulfate solution to neutralize effects of chlorination or other disinfectant treatments)
- ☐ Double Injector Module (for adding 2% thiosulfate solution to neutralize effects of chlorination or other disinfectant treatments while adding 0.1-molar hydrochloric acid to adjust pH, if necessary)



- ☐ Approximately 2 gal (4 L) of 2% sodium thiosulfate solution
- ☐ Approximately 2 gal (4 L) of 0.1-molar hydrochloric acid solution (for adjusting pH, if necessary)
- ☐ 2 sterile, 250- or 500-mL graduated cylinders
- ☐ Plastic sample bags
- ☐ Sample data sheet
- ☐ Frozen ice packs
- ☐ Several pairs of new latex gloves
- ☐ pH meter
- ☐ Thermometer



2 Turn on the water at the tap and allow the water to flow for 2 to 3 minutes or until any debris that has accumulated in the sampling line has cleared or the turbidity in the water becomes uniform.

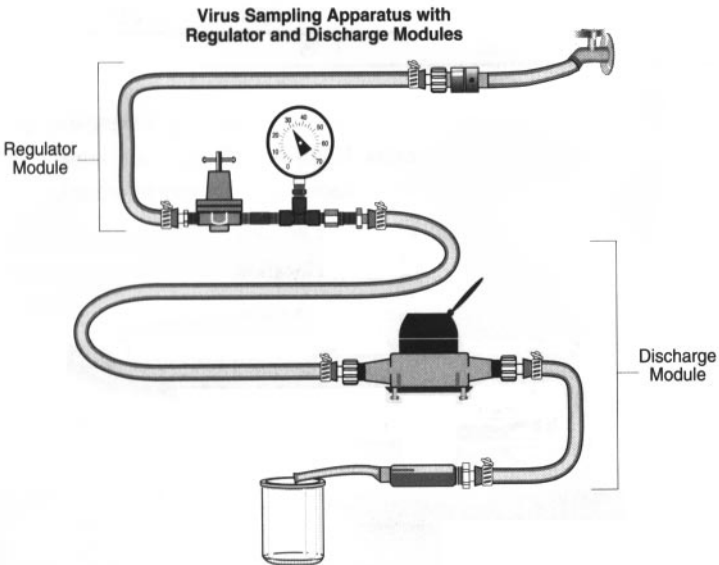
Turn off the water at the tap.

3 Put on new latex gloves to prevent contamination from outside sources. Sterile technique must be used when sampling for enteric viruses. Any contamination of the sampling apparatus may bias the final results.

Remove the foil from the backflow regulator on the Regulator Module and connect the module to the water tap or to an extension hose connected to the tap.

Remove the foil from the other end of the Regulator Module and from the Discharge Module and connect the Discharge Module to the Regulator Module.

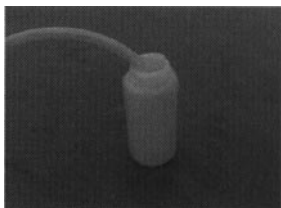
Place the end of the Discharge Module, or an extension hose connected to the Discharge Module, into a 1-liter plastic bottle.



Note the water meter reading, then slowly turn on the water.

Using the pressure regulator, adjust the water pressure to no more than 30 psi.





4

Flush the sampling apparatus with 20 gallons / 76 liters of water by allowing the water to flow through the system, out the effluent hose into the 1-liter plastic bottle.

Sampling Step	Volume In GALLONS	Volume In LITERS	Volume In FT ³
System Flush	20	76	2.7

While the water is flushing the sampling apparatus, begin completing your sample data sheet. Record the following information:

- ☐ Sample number
- ☐ System location
- ☐ Sampler's name

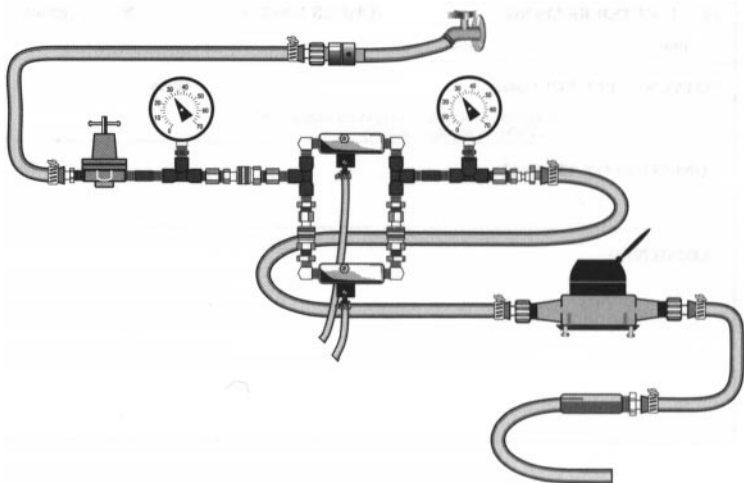
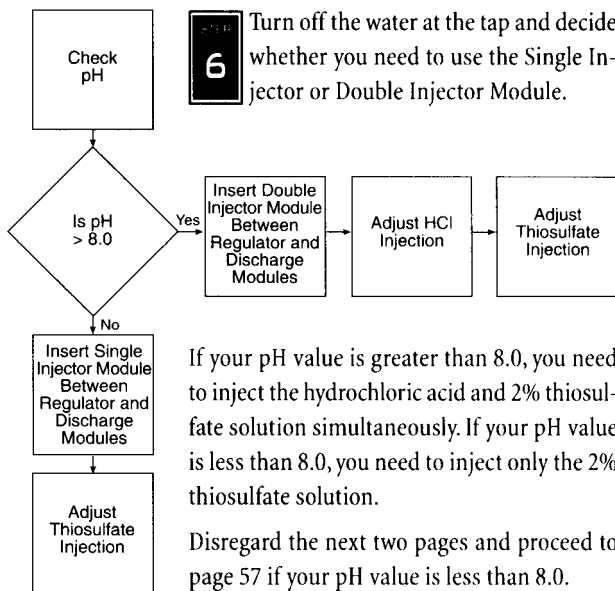
SAMPLE DATA SHEET			
SAMPLE NUMBER:			
SYSTEM LOCATION:			
SAMPLER'S NAME:			
WATER pH:	WATER TEMPERATURE:	°C	TURBIDITY: NTU
INIT. METER READING:	(CHECK UNITS)		__ft ³ __gallons
date:	time:		
FINAL METER READING:	(CHECK UNITS)		__ft ³ __gallons
date:	time:		
TOTAL SAMPLE VOLUME:			liters
(Final-Initial meter readings x 28.316 (for readings in ft ³) or x 3.7854 (for readings in gallons))			

5

Measure the pH, temperature, and turbidity of the source water flowing from the effluent hose. Record the readings on the sample data sheet.



SAMPLE DATA SHEET			
SAMPLE NUMBER:			
SYSTEM LOCATION:			
SAMPLER'S NAME:			
WATER pH:	WATER TEMPERATURE:	°C	TURBIDITY: NTU
INIT. METER READING:	(CHECK UNITS)		__ft ³ __gallons
date:	time:		
FINAL METER READING:	(CHECK UNITS)		__ft ³ __gallons
date:	time:		
TOTAL SAMPLE VOLUME:		liters	
(Final-Initial meter readings x 28.316 (for readings in ft ³) or x 3.7854 (for readings in gallons))			
CONDITION ON ARRIVAL:			
COMMENTS:			



pH > 8.0

Insert the Double Injector Module between the Regulator and Discharge Modules before proceeding.



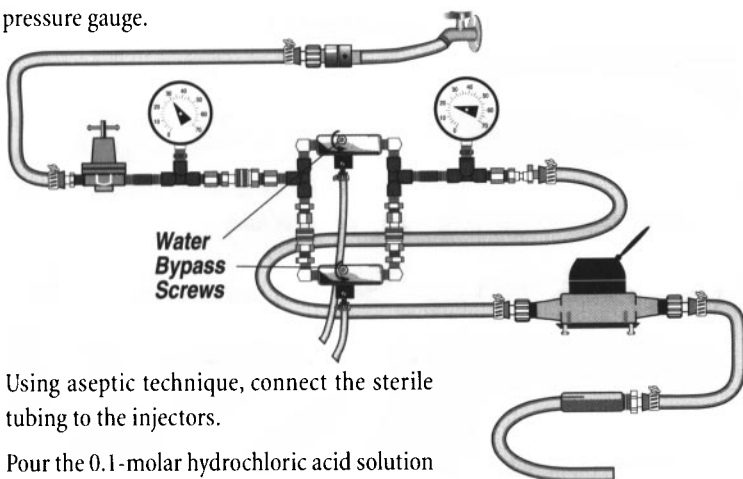
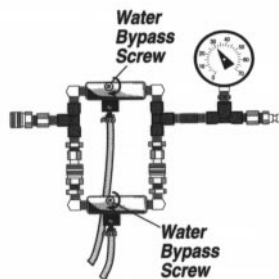
Ensure that both injectors are completely closed before proceeding.

Adjust the water bypass screws on each injector clockwise as far as possible.

Turn on the water.

Next, turn each of the screws one half turn counterclockwise.

Continue opening the water bypass screws in half-turn increments until the reading on the second pressure gauge is approximately 35% less than that shown on the Regulator Module pressure gauge.




Using aseptic technique, connect the sterile tubing to the injectors.

Pour the 0.1-molar hydrochloric acid solution into a sterile graduated cylinder and place one of the injector tubes into it.

Pour the 2% thiosulfate solution into a second, sterile graduated container. Place the tube

from the second injector into the thiosulfate solution.

 If there is no suction visibly drawing down the 2% thiosulfate or the HCl, or if too much is flowing, adjust the water bypass screws further to increase or decrease the pressure differential between the two gauges, until the flow is regulated properly.

Adjust the smaller injector screw on the hydrochloric acid injector to add sufficient hydrochloric acid to maintain a pH of 6.5 to 7.5.

After adjusting the injector, transfer the injector tube to the carboy of 0.1-molar hydrochloric acid. As sampling proceeds, periodically check the pH to ensure that it remains between 6.5 and 7.5.

Record the adjusted pH on the Sample Data Sheet.

Next, using the formula below, calculate the rate of thiosulfate injection and adjust the thiosulfate injector to deliver 10 mL of thiosulfate per gallon of flow.

$$\left(\frac{\text{Water Flow Rate}}{\text{gallons}} \right) \frac{\text{minute}}{\text{minute}} \times \frac{10 \text{ ml Thiosulfate}}{1 \text{ gallon water}} = \left(\frac{\text{Thiosulfate Injection Rate}}{\text{ml}} \right) \frac{\text{minute}}{\text{minute}}$$

After the thiosulfate flow rate is adjusted, transfer the injector tube to the carboy of thiosulfate.

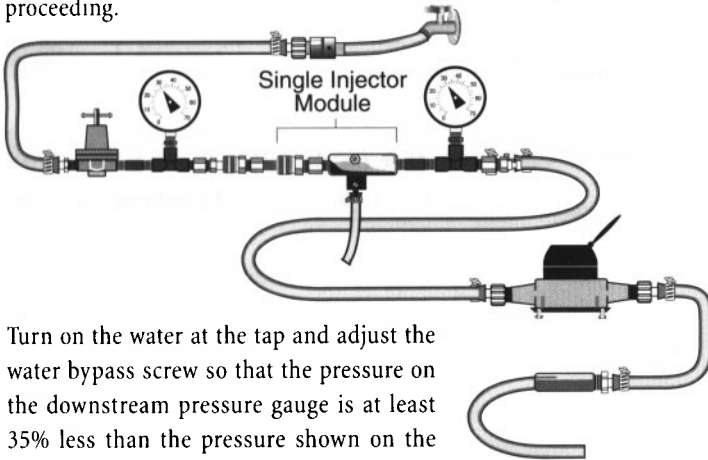
Monitor the thiosulfate flow rate visually throughout sampling.

Disregard the next section and proceed to step 7 (page 58).

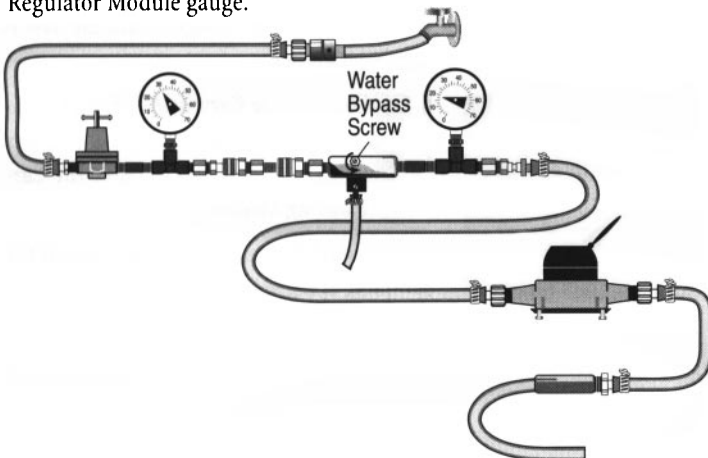
pH < 8.0

If your pH value is less than 8.0, it does not need to be adjusted, and you can use the Single Injector Module to inject the 2% sodium thiosulfate solution.

Insert the Single Injector Module between the Regulator and Discharge Modules before proceeding.



Turn on the water at the tap and adjust the water bypass screw so that the pressure on the downstream pressure gauge is at least 35% less than the pressure shown on the Regulator Module gauge.



Pour the 2% thiosulfate into a graduated cylinder.

Next, using the formula below, calculate the rate of thiosulfate injection and adjust the thiosulfate injector to deliver 10 mL of thiosulfate per gallon of flow.

$$\left(\frac{\text{Water Flow Rate}}{\text{Rate}} \right) \frac{\text{gallons}}{\text{minute}} \times \frac{10 \text{ ml Thiosulfate}}{1 \text{ gallon water}} = \left(\frac{\text{Thiosulfate Injection Rate}}{\text{Rate}} \right) \frac{\text{ml}}{\text{minute}}$$

After the thiosulfate flow rate is adjusted, transfer the injector tube to the carboy of thiosulfate.

Monitor the thiosulfate flow rate visually throughout sampling.

! If there is no suction visibly drawing down the thiosulfate, or if too much is flowing, adjust the water bypass screw further to increase or decrease the pressure differential between the two gauges, until the flow is regulated properly.



7 Connect the Cartridge Housing Module. Then reconnect the Discharge Module to the outlet end of the Cartridge Housing Module.

Slowly, start the water flowing through the sampling apparatus.

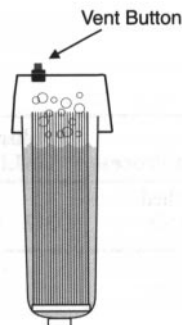
Push the red vent button on top of the filter housing to expel air in the filter. When the air is totally expelled from the filter, release the button and open the water tap completely.

Using the pressure regulator on the Regulator Module, adjust the pressure to no more than 30 psi.

Using the water bypass screw on the injector, adjust the pressure gauge on the Single Injector Module to be at least 35% less than the pressure shown on the Regulator Module gauge.

Record the following information on the Sample Data Sheet:

- ☐ Date sampling started
- ☐ Time sampling started
- ☐ Initial water meter reading (including units)



SAMPLE DATA SHEET			
SAMPLE NUMBER:			
SYSTEM LOCATION:			
SAMPLER'S NAME:			
WATER pH:	WATER TEMPERATURE:	°C	TURBIDITY: NTU
INIT. METER READING:	(CHECK UNITS)	__ft ³	__gallons
date:	time:		
FINAL METER READING:	(CHECK UNITS)	__ft ³	__gallons
date:	time:		
TOTAL SAMPLE VOLUME:		liters	
(Final-Initial meter readings x 28.316 (for readings in ft ³) or x 3.7854 (for readings in gallons))			
CONDITION ON ARRIVAL:			

STEP 8 Collect 317 - 396 gallons or 1200 to 1500 liters of finished water.

Sampling Process	Volume In GALLONS	Volume In LITERS	Volume In FT ³
Virus Finished Water Sample	317 - 396	1200 - 1500	43 - 53

STEP 9 When the water meter indicates that 317 - 396 gallons / 1200 - 1500 liters of water have passed through the filter, turn off the water at the tap.

Record the following information on the Sample Data Sheet:

- ☐ Date sampling ended
- ☐ Time sampling ended
- ☐ Final water meter reading (including units)

SAMPLE DATA SHEET			
SAMPLE NUMBER:			
SYSTEM LOCATION:			
SAMPLER'S NAME:			
WATER pH:	WATER TEMPERATURE:	°C	TURBIDITY: NTU
INIT. METER READING:	(CHECK UNITS)	__ft ³	__gallons
date:	time:		
FINAL METER READING:	(CHECK UNITS)	__ft ³	__gallons
date:	time:		
TOTAL SAMPLE VOLUME:		liters	
(Final-Initial meter readings x 28.316 (for readings in ft ³) or x 3.7854 (for readings in gallons))			



Put on fresh latex gloves.

Carefully, disconnect the sampling apparatus from the water tap.

Disconnect the Cartridge Housing Module from the sampling train. Turn the filter housing upside down and allow excess water to flow out as waste water.

Turn the housing upright, and cover the module ends with sterile foil.



Do not attempt to open the filter housing.



The filter and filter housing are shipped to the laboratory intact. The Discharge Module may be retained at the utility and reused.



Place the filter housing into an insulated shipping box.

Set the ice packs around the housing.

Return the Regulator Module and the Injector Module to the laboratory for cleaning and sterilization.

Place the Sample Data Sheet in a plastic bag and pack it on top of the sampling apparatus. Seal the container.



You may need to use additional packing material to ensure that the contents of the box will not shift during transport.





STEP
11

Ship the container by overnight courier to the laboratory. Call the laboratory and notify them of the sample shipment.

CREDITS AND ACKNOWLEDGMENTS

The use of Manufacturer Trade Names in the production does not constitute endorsement by the U.S. Environmental Protection Agency.

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